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# Nautical Chart Working Group (NCWG 10) Baseline Symbolology Project Team (BSPT)

Work Progress and Update  
Monaco  
13 November 2024

# Baseline Symbology Project Team Goals

## Mandate:

Establish a common IHO symbology, based on S-4, which can be used to support the automated creation of paper chart products directly from S-101 data. A common symbology library will help hydrographic offices, private industry, developers and others, to view ENC data and facilitate direct creation of ENC derived products more efficiently and quickly.

## Key objectives:

- a) Development of a symbol library comprising a common set of symbols (in SVG format) and related portrayal rules. This will support efforts toward the automated or semi-automated creation of paper charts.
- b) Submit the SVG baseline symbol library, based on S-4, compatible to the requirements of the IHO Geospatial Information Registry as defined in S-100 Part 9, Appendix 9-



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# Background

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## NCWG 5

- Discussed issues pertaining to the automated production of paper charts directly from ENCs.
- Need for a common IHO baseline for symbology (rule based) agreed.
- Recommendation to HSSC to add work item to NCWG Work Plan.

## HSSC 12

- Report on the Future of the Paper Nautical Chart – presented and recommendation made to add new work task.
- The FOPNC report discusses the background behind the recommended action in greater detail.
- Resulted in Action HSSC12/36 : HSSC tasked the NCWG to add a work item in its work plan to develop ways to enable or enhance HOs’ ability to produce paper charts or raster chart images directly from S-101.[The goal is to create a ‘Common IHO Baseline Symbology’ including basic symbol sets and rules.]
- New Work item Added to NCWG Work Plan:

E11	Develop baseline symbology to support automated chart production	H	NCWG6 – discuss and agree work tasks	2020		P		INT1, S-4	New proposal by NCWG at HSSC12
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## NCWG 6

- The group discussed the issue and how best to approach the task.
- Decided to establish a separate project team to look further at the issue and develop a mandate.

**Action 6/1 – Members interested in joining baseline symbology VTC meeting should contact the contact chair, then subsequently arrange a meeting date and develop a mandate.**




# BSPT Team Structure

- **Key team members**

- Colby Harmon, Christie Ence (NOAA)
- Samantha Lerigo, Nick Rodwell(UKHO)
- Mikko Hovi (Finnish Transport and Communications Agency Traficom)
- Patricia Sheastley (ESRI)
- Peter Schwarberg (Teledyne CARIS)
- Daniel Brousseau (CHS)
  
- Other members were invited in 2023-2024



# Colour Table Overview: Circular letter 05/ 2024

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**NAUTICAL CARTOGRAPHY WORKING GROUP**

Chair: Mikko Hovi  
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**NCWG Letter 05/2024**

To NCWG Members

23 April 2024

**NCWG Base Symbology Project Team recommendation of Standard Colours for the automated creation of ENC derived paper charts**

Dear Colleagues,

This letter presents the NCWG's Baseline Symbology Project Team (BSPT) recommendations for baseline colours to be used for the automated creation of ENC derived paper charts. Feedback on the recommended colours is requested.

Please reply, using the response form at Annex B, **no later than 17 June 2024**. I ask you to use the 'Reply to all' option for responses, to ensure the full Working Group membership is aware of developing discussions.

Yours sincerely,



Mikko Hovi  
Chair NCWG



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# Recommended colours for use in the SVG symbols

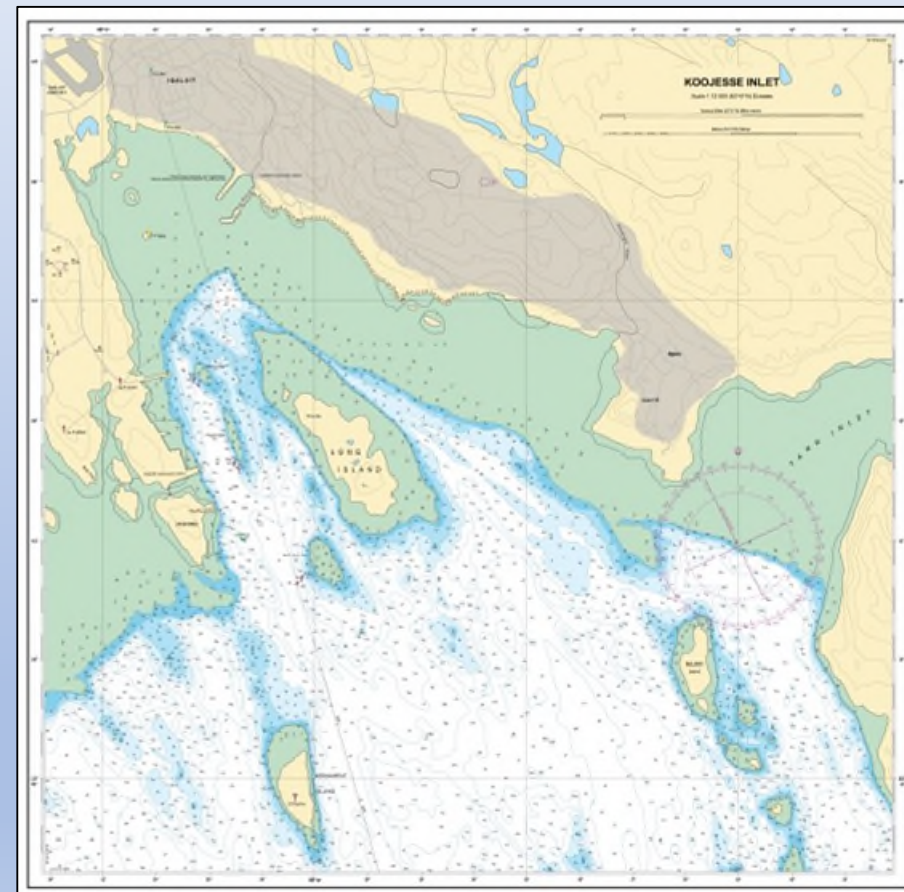
## Annex A – BSPT Recommended Baseline Chart Colours

Primary Use	Name	Canada	Finland	New Zealand	United Kingdom	US (NOAA)	Average	Average Red	Average Green	Average Blue	No. in Average
Coastline	Black							0	0	0	5
Land	Buff							251	240	198	5
Land infrastructure	Grey				X			195	194	186	4
Topography	Brown		X		X			119	86	42	3
Urban areas	Light Grey							215	209	195	5
Intertidal	Intertidal Green		X					193	222	199	4
Depth contours	Contour Blue							23	136	186	5
Shallow depth area	Dark Blue							133	207	235	5
Medium depth area	Medium Blue		X	X	X			177	225	244	*
Deeper depth area	Light Blue							221	242	253	5
Compass rose and aids	Nautical Purple							156	59	142	5
Traffic separation	Light Purple							229	158	233	5
Red aids	Red			X				237	28	36	**
Orange aids	Orange			X	X	X		247	148	62	**
Yellow aids	Yellow			X		X		255	218	0	**
Green aids and areas	Green			X				0	176	133	**
White aids and other	White							255	255	255	5

X Hydrographic office does not use or did not provide a sample of this colour.

\* Medium blue is the average of the average dark blue and average light blue RGB values.

\*\* Canadian RGB values for red, orange, yellow, and green were adopted rather than the average colours.





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# Colour Table Approval and token

**NCWG Baseline Symbology Project Team**  
**ENC Derived Paper Chart Colour Palette**  
 August 14, 2024
















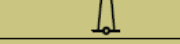

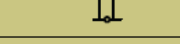
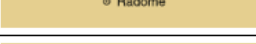
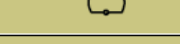
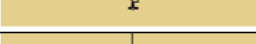



Primary Use	Token	Name	Sample	Red	Green	Blue
Coastline	PPRBLK	Black		0	0	0
Land	PPRLND PPRBUF	Buff		251	240	198
Land infrastructure	PDKGRY	Grey		195	194	186
Topography	PBROWN	Brown		119	86	42
Urban areas	PLTGRY	Light Grey		215	209	195
Intertidal	PINTTD PLTGRN	Intertidal Green		193	222	199
Depth contours	PCONTR PRCBLU*	Contour Blue		23	136	186
Shallowest depth area(s)	PDKBLU	Dark Blue		133	207	235
2 <sup>nd</sup> Shallowest depth area(s)	PMDBLU	Medium Blue		177	225	244
3 <sup>rd</sup> Shallowest depth area(s)	PLTBLU	Light Blue		221	242	253
Deeper depth areas	PWHITE	White		255	255	255
Compass rose and aids	PDKPRP	Nautical Purple		156	59	142
Traffic separation	PLTPRP	Light Purple		229	158	233
Red aids	PPRRED	Red		237	28	36
Orange aids	PORANG	Orange		247	148	62
Yellow aids	PYELLO	Yellow		255	218	0
Green aids and areas	PGREEN PDKGRN	Green		0	176	133



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# SVG Creation Process (research and ideation)

Using the INT1 publication in conjunction with the S4 Standard to review and assess symbols, lines and areas to be created in SVG format NOAA publication example

BSPT No.	INT Ltr	INT No.	INT Symbol	INT Description	ENC Symbol	ENC Description
	E	25.2		Windmill (without sails)		Windmill, status of ruins is obtained by cursor pick
	E	26.1		Wind turbine, Windmotor		Wind motor
	E	26.2		Onshore wind farm		Wind generator farm
	E	27		Flagstaff, Flagpole		Flagstaff, Flagpole
	E	28		Radio mast, Television mast		Mast
	E	29		Radio tower, Television tower		Radio, television tower
	E	30.1		Radar mast		Mast
	E	30.2		Radar tower		Radar tower
	E	30.3		Radar scanner		Radar scanner
	E	30.4		Radome		Radome
	E	31		Dish aerial		Dish aerial
	E	32		Tanks		Tank





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## Symbol library for conversion to SVG format

UKHO provided the base symbol,  
line and areas library and  
dictionary for the BSPT to use

CHS, contracted Teledyne CARIS  
to build a converter inside the  
HPD Process Designer for points.

Teledyne CARIS, converted the  
UKHO symbol library to SVG  
format

## Design review and feedback

E10_1_CHURCH.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E11_CHAPEL.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E13_TEMP_OBS.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E13_TEMPLE.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E14_PAGODA.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E15_SHINTO.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E16_B_T_OBS.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E16_BUD_TEMP.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E17_MOSQUE.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E18_MARABOUT.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	4 KB
E19_CEMETERY_S0_E19_CEMETRYA.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	1 KB
E20_TOWER.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	3 KB
E21_WA_TR.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	3 KB
E22_CHY.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	3 KB
E23_FL_STK.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	3 KB
E24_MON.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	3 KB
E25_WINDMIL.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E26_TURBINE.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E26_WIND_F_S0_E26_WIND_FA.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	2 KB
E26_WINDMOT.svg	15/11/22 11:17 AM	Microsoft Edge HTM...	3 KB
E27_FLAG_S0_FLAG_BOT.sva	15/11/22 11:17 AM	Microsoft Edae HTM...	2 KB



## SVG Creation Process (initial design draft)

- Contract to convert lines and areas to SVG (S-100 standards). More complex than anticipated
- Contract to also complete the templates
- IIC was the winning bidder
- Canadian Hydrographic Service funded the contracts thru OPP2
- CHS sees two benefits:
  - IHO to have the SVG library of S4/INT1 features
  - CHS: will help create the “paper charts of the future”, i.e. paper Chart 2.0 or other paper chart creation process.



## SVG Creation Process (initial design draft)

- **April to June (hopeful)**
  - Analyse the contract results (confirm symbols and templates)
  - Creation of display rules



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# Current Status of SVG Creation

- Progress updates on SVG designs
- Number of symbols created and examples
- Requirement to integrate the approved color palette into template and SVGs

Submarine Pipeline Area 04 Jun 2024

Geo	S-101 Feature	S-101 Encoding	S-101 DP	S-101 Symbol	S-101 Symbol	S-57 Feature	S-57 Encoding	S-4	INT1 Symbol	S-57 DP	BSPT Symbol	BSPT Symbol	BSPT Label	Case	Font	Font Style	Text Size	Text color
A	SubmarinePipelineArea	categoryOfPipelinePipe=6	9	PIPARE51		PIPARE	CATPIP = 6	443.2	L40.2	3	EMPIP AR1M		n/a					
A	SubmarinePipelineArea	categoryOfPipelinePipe=2 or categoryOfPipelinePipe=3	9	PIPARE61		PIPARE	CATPIP = 2, 3, 4, 5	443.2	L41.2		EMPIP AR2M		n/a					
A	SubmarinePipelineArea	categoryOfPipelinePipe=4 and product=3		PIPARE61		PIPARE	CATPIP=4 PRODUCT=3	443.2	L41.2		EMPIP AR2M		Sewer					
A	SubmarinePipelineArea	categoryOfPipelinePipe=3 and product=3		PIPARE61		PIPARE	CATPIP=3 PRODUCT=3	443.2	L41.2		EMPIP AR2M		Intake					
A	SubmarinePipelineArea	categoryOfPipelinePipe=2 and product=3		PIPARE61		PIPARE	CATPIP=2 PRODUCT=3	443.2	L41.2		EMPIP AR2M		Outfall					
A	SubmarinePipelineArea	categoryOfPipelinePipe=6 and product=1		PIPARE51		PIPARE	CATPIP=6 PRODUCT=1	443.2	L40.2		EMPIP AR1M		Oil					
A	SubmarinePipelineArea	categoryOfPipelinePipe=6 and product=2		PIPARE51		PIPARE	CATPIP=6 PRODUCT=2	443.2	L40.2		EMPIP AR1M		Gas					
A	SubmarinePipelineArea	categoryOfPipelinePipe=6 and product=3		PIPARE51		PIPARE	CATPIP=6 PRODUCT=3	443.2	L40.2		EMPIP AR1M		Water					
A	SubmarinePipelineArea	categoryOfPipelinePipe=6 and product=7		PIPARE51		PIPARE	CATPIP=6 PRODUCT=7	443.2	L40.2		EMPIP AR1M		Chem					



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# Examples: Wrecks

Wrecks 24 June 2024																	
Geo	S-101 Feature	S-101 Encoding	S-101 DP	S-101 Symbol	S-57 Feature	S-57 Encoding	S-4	INT1 Symbol	S-57 DP	BSPT Symbol	BSPT Symbol	BSPT Label	Case	Font	Font Style	Text Size	Text color
A	Wreck, hull never covers, on large scale charts, height above height datum	categoryOfWreck : 5 =Wreck Showing Any Portion of Hull or Superstructure waterLevelEffect: 2 = Always Dry	12		WRECKS	CATWRK : 5 =Wreck Showing Any Portion of Hull or Superstructure  WATLEV : 2 = Always Dry	422.1	K 20	4	TBD		Wk			bkitali 5	9	CHBLK
A	Wreck, covers and uncovers, on large scale charts, height above chart datum	categoryOfWreck : 5 =Wreck Showing Any Portion of Hull or Superstructure waterLevelEffect:: 4 = Covers and Uncovers valueOfSounding= 5.2	12		WRECKS	CATWRK : 5 =Wreck Showing Any Portion of Hull or Superstructure WATLEV : 4 = Covers and Uncovers:	422.1	K 21	4			Wk			bkitali 5	9	CHBLK
A	Submerged wreck, depth known, on large scale charts	categoryOfWreck : 5 =Wreck Showing Any Portion of Hull or Superstructure waterLevelEffect : 3 = Always Under Water/Submerged	12		WRECKS	CATWRK : 5 =Wreck Showing Any Portion of Hull or Superstructure WATLEV : 3 = Always Under Water/Submerged	422.1	K 22	4			Wk			bkitali 5	9	CHBLK
P	Wreck showing any portion of hull or superstructure at level of chart datum	categoryOfWreck : 4 = Wreck Showing Mast/Masts categoryOfWreck : 5 =Wreck Showing Any Portion of Hull or Superstructure  waterLevelEffect: 2 = Always Dry waterLevelEffect:: 4 = Covers and Uncovers	12		WRECKS	CATWRK: 4 = Wreck Showing Mast/Masts  CATWRK: 5 =Wreck Showing Any Portion of Hull or Superstructure  WATLEV: 2 = Always Dry  WATLEV:: 4 = Covers and Uncovers	422.2	K 24	4	K24STWk							
P	Wreck, least depth known by sounding only	categoryOfWreck : 2 = Dangerous Wreck waterLevelEffect:: 5 = Awash	12		WRECKS	CATWRK: 2 = Dangerous Wreck WATLEV:: 5 = Awash	422.4	K 26	4	DANGER02		Wk			bkitali 5	9	CHBLK
P	Dangerous wreck, depth unknown	categoryOfWreck : 2 = Dangerous Wreck waterLevelEffect:: 3 = Always Under Water/Submerged	12		WRECKS	CATWRK: 2 = Dangerous Wreck WATLEV:: 3 = Always Under Water/Submerged	422.6	K 28	4	WRECKS05		Masts			bkitali 5	9	CHBLK



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# Examples: Offshore production and Dumping Ground

Offshore Production Area 30 May 2024

Geo	S-101 Feature	S-101 Encoding	S-101 DP	S-101 Symbol	S-101 Symbol	S-57 Feature	S-57 Encoding	S-4	INT1 Symbol	S-57 DP	BSPT Symbol	BSPT Symbol	BSPT Label	Case	Font	Font Style	Text Size	Text color
A	OffshoreProductionArea	categoryOfOffshoreProductionArea=1	12	<del>CTVARE51</del>		OSPARE	<del>CATPRA=9</del>	445.9	L5.2.1	3	IL52WINDF		n/a					
A	OffshoreProductionArea	categoryOfOffshoreProductionArea=1 and restriction=8	12	<del>CTVARE51</del>		OSPARE	<del>CATPRA=9</del> <del>RESTRN=8</del>	445.9	L5.2.2		IL522WINDRESAR ES1		n/a					
A	OffshoreProductionArea	categoryOfOffshoreProductionArea=2	12	<del>CTVARE51</del>		OSPARE		445.12	L6.1		IL6WAVEFARM		n/a					
A	OffshoreProductionArea	categoryOfOffshoreProductionArea=2 and restriction=8	12	<del>CTVARE51</del>		OSPARE	<del>RESTRN=8</del>	445.12	L6.2		IL61WAVEFARMRESAR ES1		n/a					
A	OffshoreProductionArea	categoryOfOffshoreProductionArea=1 waterLevelEffect=7	12	<del>CTVARE51</del>		OSPARE	<del>CATPRA=9</del> <del>WATLEV=7</del>	445.9	L5.2.2	3	IL522WINDRESAR ES1		n/a					

Dumping Ground 31 March 2024

Geo	S-101 Feature	S-101 Encoding	S-101 DP	S-101 Symbol	S-101 Symbol	S-57 Feature	S-57 Encoding	S-4	INT1 Symbol	S-57 DP	BSPT Symbol	BSPT Symbol	BSPT Label	Case	Font	Font Style	Text Size	Text color
A	DumpingGround	categoryOfDumpingGround=4 (Explosives Dumping Ground)	9			DMPGRD	<del>CATDRG=4</del>	442.2	N23.1a		TBD		Explosive Dumping Ground	Sentence case	serifs	<del>mesen</del> <del>ta</del>	10	<del>CHM</del> <del>GD</del>
A	DumpingGround	categoryOfDumpingGround=4 (Explosives Dumping Ground) status=4 (Not in Use)	9			DMPGRD	<del>CATDRG=4</del> <del>STATUS=4</del>	443.2	N23.2				Explosive Dumping Ground (disused)	Sentence case	serifs	<del>mesen</del> <del>ta</del>	10	<del>CHM</del> <del>GD</del>
A	DumpingGround	categoryOfDumpingGround=5 (Spoil Ground)	9			DMPGRD	<del>CATDRG=5</del>	443.2	N62.1				Spoil Ground	Sentence case	serifs	<del>mesen</del> <del>ta</del>	10	<del>CHM</del> <del>GD</del>
A	DumpingGround	categoryOfDumpingGround=5 (Spoil Ground) status=4 (Not in Use)	9			DMPGRD	<del>CATDRG=5</del> <del>STATUS=4</del>	443.2	N62.2				Spoil Ground (discussed)	Sentence case	serifs	<del>mesen</del> <del>ta</del>	10	<del>CHM</del> <del>GD</del>
A	DumpingGround	categoryOfDumpingGround=2 (Chemical Waste Dumping Ground)	9			DMPGRD	<del>CATDRG=2</del>	442.2	N24				Dumping Ground for Chemicals	Sentence case	serifs	<del>mesen</del> <del>ta</del>	10	<del>CHM</del> <del>GD</del>
P	DumpingGround	categoryOfDumpingGround=5 (Spoil Ground)	9	CHINFO07		DMPGRD	<del>CATDRG=4</del>	442.3	N23.1b		<del>N23EXDGI</del>							



# Challenges and Solutions

- SVG Format of SVG
  - LUA (ECDIS and some data producers)
  - Other (data producers)
- 60% produced
- How to complete the rest
  - Contracts, HO capability, others
    - CHS might have some funds
- How to approach the review
  - Test Bed required



## Quality assurance

- Testing SVG files for:
  - Cross-platform compatibility
  - Rendering accuracy and usability
- Adjustments made based on testing outcome





## Next steps

### **Some results by end of March 2025**

- **Requirement for a new contract or partners to complete the conversation**
- **Review of the templates created during the 2024 contract**
- **Completion of the Creation of SVG lines and areas**
- **Review of the .SVG's and creation of display rules and in-depth analysis**

### **Summer to fall 2025:**

- **Submission of SVG features and rules to NCWG and IHO Geospatial registry**



## Q&A

### Baseline Symbology project Team:

#### Contact information:

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Thank You